Radionuclide	Absorption type [3]			Absorption type [3]			Stochastic or organ or tissue [1]
	μCi/mL			Bq/m [3]			
	F	M	S	F	M	S	(F/M/S)
Bk-249	–	1 E−09	–	–	5 E+01	–	/BS/
Bk-250	–	2 E−07	–	–	9 E+03	–	/BS/
Cf-244	–	1 E−08	–	–	5 E+02	–	/ET/
Cf-246	–	1 E−09	–	–	5 E+01	–	/St/
Cf-248	–	5 E−11	–	–	2 E+00	–	/BS/
Cf-249	–	3 E−12	–	–	1 E−01	–	/BS/
Cf-250	–	7 E−12	–	–	2 E−01	–	/BS/
Cf-251	–	3 E−12	–	–	1 E−01	–	/BS/
Cf-252	–	1 E−11	–	–	6 E−01	–	/BS/
Cf-253	–	5 E−10	–	–	2 E+01	–	/St/
Cf-254	–	2 E−11	–	–	8 E−01	–	/BS/
Es-250	–	4 E−07	–	–	1 E+04	–	/BS/
Es-251	–	3 E−07	–	–	1 E+04	–	/St/
Es-253	–	2 E−10	–	–	9 E+00	–	/St/
Es-254m	–	1 E−09	–	–	5 E+01	–	/St/
Es-254	–	6 E−11	–	–	2 E+00	–	/BS/
Fm-252	–	2 E−09	–	–	8 E+01	–	/St/
Fm-253	–	1 E−09	–	–	6 E+01	–	/St/
Fm-254	–	6 E−09	–	–	2 E+02	–	/ET/
Fm-255	–	2 E−09	–	–	8 E+01	–	/St/
Fm-257	–	1 E−10	–	–	4 E+00	–	/St/
Md-257	–	2 E−08	–	–	1 E+03	–	/St/
Md-258	–	1 E−10	–	–	4 E+00	–	/St/

FOOTNOTES FOR APPENDIX A

[1] A determination of whether the DACs are controlled by stochastic (St) or deterministic (organ or tissue) dose, or if they both give the same result (E), for each absorption type, is given in this column. The key to the organ notation for deterministic dose is: BS = Bone surface, ET = Extrathoracic, K = Kidney, L = Liver, and T = Thyroid. A blank indicates that no calculations were performed for the absorption type shown.

[2] The ICRP identifies these materials as soluble or reactive gases and vapors or highly soluble or reactive gases and vapors. For tritiated water, the inhalation DAC values allow for an additional 50% absorption through the skin, as described in ICRP Publication No. 68, Dose Coefficients for Intakes of Radionuclides by Workers. For elemental tritium, the DAC values include a factor that irradiation from gas within the lungs might increase the dose by 20%.

[3] A dash indicates no values given for this data category.

[4] DAC values derived using hafnium tritide particle and are based on ''observed activity'' (i.e, only radiation emitted from the particle is considered). DAC values derived using methodology found in Radiological Control Programs for Special Tritium Compounds, DOE–HDBK–1184–2004.

[5] These values are appropriate for protection from radon combined with its short-lived decay products and are based on information given in ICRP Publication 65: Protection Against Radon-222 at Home and at Work and in DOE–STD–1121–98: Internal Dosimetry. The values given are for 100% equilibrium concentration conditions of the short-lived radon decay products with the parent. To allow for an actual measured equilibrium concentration or a demonstrated equilibrium concentration, the values given in this table should be multiplied by the ratio (100%/actual %) or (100%/demonstrated %), respectively. Alternatively, the DAC values for Rn-220 and Rn-222 may be replaced by 2.5 working level (WL) and 0.83 WL, respectively, for appropriate limiting of decay product concentrations. A WL is any combination of short-lived radon decay products, in one liter of air without regard to the degree of equilibrium, that will result in the ultimate emission of 1.3 E+05 MeV of alpha energy.

[72 FR 31927, June 8, 2007]

APPENDIX B TO PART 835 [RESERVED]

APPENDIX C TO PART 835—DERIVED AIR CONCENTRATION (DAC) FOR WORKERS FROM EXTERNAL EXPOSURE DURING IMMERSION IN A CLOUD OF AIRBORNE RADIOACTIVE MATERIAL

a. The data presented in appendix C are to be used for controlling occupational exposures in accordance with §835.209, identifying the need for air monitoring in accordance with §835.403 and identifying the need for posting of airborne radioactivity areas in accordance with §835.603(d).

b. The air immersion DAC values shown in this appendix are based on a stochastic dose

limit of 5 rems (0.05 Sv) per year. Four columns of information are presented: (1) Radionuclide; (2) half-life in units of seconds (s), minutes (min), hours (h), days (d), or years (yr); (3) air immersion DAC in units of μCi/mL; and (4) air immersion DAC in units of Bq/m3. The data are listed by radionuclide in order of increasing atomic mass. The air immersion DACs were calculated for a continuous, nonshielded exposure via immersion in a semi-infinite cloud of airborne radioactive material. The DACs listed in this appendix may be modified to allow for submersion in a cloud of finite dimensions.

c. The DAC values are given for individual radionuclides. For known mixtures of radionuclides, determine the sum of the ratio of the observed concentration of a particular radionuclide and its corresponding DAC for all radionuclides in the mixture. If this sum exceeds unity (1), then the DAC has been exceeded. For unknown radionuclides, the most restrictive DAC (lowest value) for those isotopes not known to be absent shall be used.

AIR IMMERSION DAC

Air immersion DAC			
Radionuclide	Half-Life	(μCi/mL)	(Bq/m^3)
Ar-37	35.02 d	1 E+00	4 E+10
Ar-39	269 yr	4 E–04	1 E+07
Ar-41	1.827 h	1 E–06	3 E+04
Kr-74	11.5 min	1 E–06	4 E+04
Kr-76	14.8 h	3 E–06	1 E+05
Kr-77	74.7 h	1 E–06	5 E+04
Kr-79	35.04 h	5 E–06	2 E+05
Kr-81	2.1E+05 yr	2 E–04	9 E+06
Kr-83m	1.83 h	2 E–02	9 E+08
Kr-85	10.72 yr	2 E–04	9 E+06
Kr-85m	4.48 h	9 E–06	3 E+05
Kr-87	76.3 min	1 E–06	5 E+04
Kr-88	2.84 h	6 E–07	2 E+04
Xe-120	40.0 min	3 E–06	1 E+05
Xe-121	40.1 min	7 E–07	2 E+04
Xe-122	20.1 h	2 E–05	1 E+06
Xe-123	2.14 h	2 E–06	8 E+04
Xe-125	16.8 h	5 E–06	2 E+05
Xe-127	36.406 d	5 E–06	2 E+05
Xe-129m	8.89 d	6 E–05	2 E+06
Xe-131m	11.84 d	1 E–04	6 E+06
Xe-133	5.245 d	4 E–05	1 E+06
Xe-133m	2.19 d	4 E–05	1 E+06
Xe-135	9.11 h	5 E–06	2 E+05
Xe-135m	15.36 min	3 E–06	1 E+05
Xe-138	14.13 min	1 E–06	4 E+04

For any single radionuclide not listed above with decay mode other than alpha emission or spontaneous fission and with radioactive half-life less than two hours, the DAC value shall be 6 E–06 μCi/mL (2 E+04 Bq/m^3).

[72 FR 31940, June 8, 2007]

APPENDIX D TO PART 835—SURFACE CONTAMINATION VALUES

The data presented in appendix D are to be used in identifying the need for posting of contamination and high contamination areas in accordance with §835.603(e) and (f) and identifying the need for surface contamination monitoring and control in accordance with §§835.1101 and 835.1102.

SURFACE CONTAMINATION VALUES[1] IN DPM/100 CM[2]

Radionuclide	Removable[2,4]	Total (Fixed + Removable)[2,3]
U-nat, U-235, U-238, and associated decay products	[7]1,000	[7]5,000
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	20	500
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	200	1,000
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above[5]	1,000	5,000